

IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

In re application of

Hiroaki INOUE et al. : Attn: **BOX PCT**

Serial No. NEW : Docket No. **2001_1094A**

Filed August 1, 2001

ELECTROLESS PLATING LIQUID AND METHOD
OF FORMING INTERCONNECTION USING SUCH
AN ELECTROLESS PLATING LIQUID

[Corresponding to PCT/JP00/09099

Filed December 21, 2000]

PRELIMINARY AMENDMENT

Assistant Commissioner for Patents,
Washington, DC 20231

Sir:

Prior to calculating the filing fee, please amend the above-identified application as follows:

IN THE SPECIFICATION

Page 1, immediately after the title, please insert:

This application is a 371 of PCT/JP00/09099 filed December 21, 2000.

IN THE CLAIMS

Please amend claim 5 as follows:

5. (Amended) A method of forming a copper interconnection on a semiconductor device, characterized by the steps of forming an auxiliary seed layer for reinforcing a copper seed layer in an interconnection groove defined in a surface of the semiconductor device using an electroless copper plating liquid containing dihydric copper ions, a complexing agent, and an aldehyde acid, and performing an electrolytic plating process using the seed layer including said auxiliary seed

ATTACHMENT D

layer as a current feeding layer, for thereby filling copper in the interconnection groove defined in the surface of the semiconductor device.

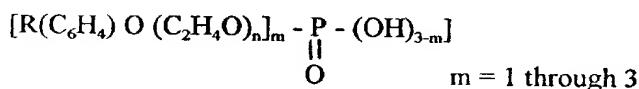
Kindly add the following new claims:

13. A method of forming a copper interconnection on a semiconductor device, characterized by the steps of forming an auxiliary seed layer for reinforcing a copper seed layer in an interconnection groove defined in a surface of the semiconductor device using an electroless copper plating liquid containing dihydric copper ions, a complexing agent, and an organic alkali, and performing an electrolytic plating process using the seed layer including said auxiliary seed layer as a current feeding layer, for thereby filling copper in the interconnection groove defined in the surface of the semiconductor device.

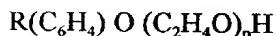
14. A method of forming a copper interconnection according to claim 13, characterized by performing an electroless copper plating process at a plating rate of 50 nm/min. or less using said electroless copper plating liquid.

15. A method of forming a copper interconnection according to claim 13, characterized in that said electroless copper plating liquid contains polyoxyethylene alkylphenylether phosphoric acid and/or polyoxyethylene alkylphenylether, which has the structure indicated below, at a concentration ranging from 1 to 100 mg/L:

(polyoxyethylene alkylphenylether phosphoric acid)



(polyoxyethylene alkylphenylether)



16. A method of forming a copper interconnection according to claim 13, characterized in that said complexing agent comprises EDTA• 4H (ethylenediaminetetraacetic acid), said aldehyde

acid comprises a glyoxylic acid, and said organic alkali comprises TMAH (tetramethylammonium hydroxide).

17. A method of forming a copper interconnection according to claim 16, characterized in that said copper ions have a concentration ranging from 0.01 to 10.0 g/L, said EDTA• 4H has a concentration ranging from 0.5 to 100 g/L, said glyoxylic acid has a concentration ranging from 1 through 50 g/L, and the electroless copper plating liquid has a pH adjusted to a range from 10 to 14 by said TMAH.

REMARKS

The specification has been amended to reflect the 371 status. In addition, claim 5 has been amended so as to be divided into two separate claims, i.e. claim 5 is amended and claim 13. New claims 14-17 correspond to original claims 6-9, respectively.

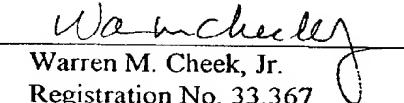
Attached hereto is a marked-up version of the changes made to the specification and claims by the current amendment. The attached pages are captioned "Version with markings to show changes made".

Favorable action on the merits is solicited.

Respectfully submitted,

Hiroaki INOUE et al.

By


Warren M. Cheek, Jr.
Registration No. 33,367
Attorney for Applicants

WMC/dlk
Washington, D.C. 20006-1021
Telephone (202) 721-8200
Facsimile (202) 721-8250
August 1, 2001